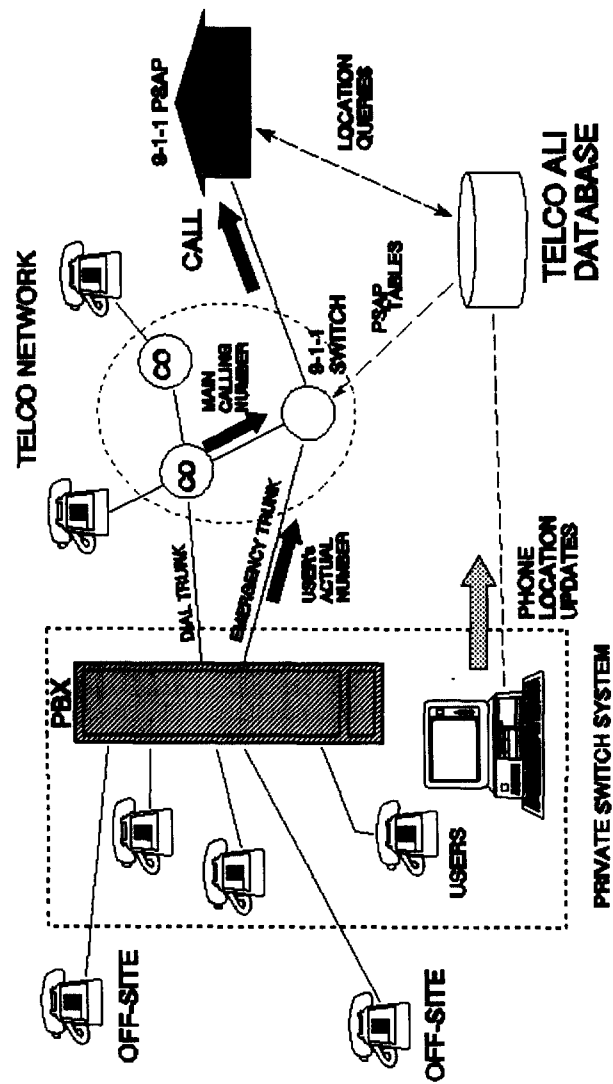


Issues such as database accuracy, integrity, and security are also best handled at the local level and should not be subject to Commission rules. Figure 2 is a diagram of how a PBX might connect to an existing E9-1-1 network.

F. Local Exchange Company Services

Competition in the local loop has the potential to radically change how E9-1-1 services are purchased and deployed. Providers other than LECs may want to provide E9-1-1 switching and database services, or the local government may want to manage their own system and buy switching from one provider and transport from another. To ensure the utmost flexibility in this process, the Commission should require that all providers of "dial-tone or its functional equivalent" provide the following:

1. Complete and unfettered access by their customers to whatever E9-1-1 system exists.
2. Whatever interface is required to meet the technical requirements of the E9-1-1 system.
3. Complete subscriber records as defined in applicable NENA or TIA documents with regular updates in a timely manner as required by the local E9-1-1 system administrator (usually 24 hours).



PRIVATE SWITCH CONNECTION TO THE ENHANCED 9-1-1 SYSTEM DIRECT DATA INPUT TO THE ALI DATABASE

Adcomm Engineering

4. Complete cooperation to bring their subscriber database up to the required accuracy standards developed by the local E9-1-1 system administrator.

All providers of "dial-tone or its functional equivalent" should be required by the FCC to provide enhanced 9-1-1 interconnection.

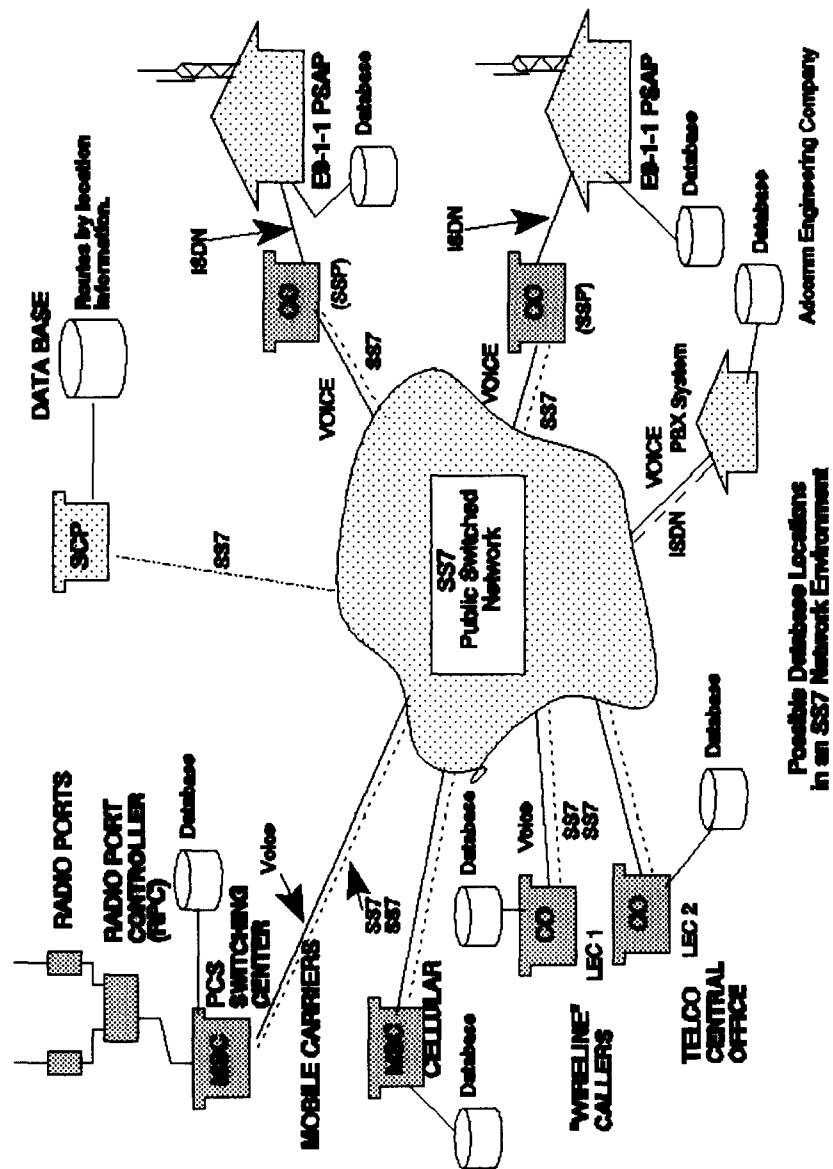
The Commission should also require that all new network services, switching, and transport mechanisms be deployed with E9-1-1 as part of the service offering. The existing E9-1-1 systems have generally been "stuck" with 30-year-old technology because new network technologies (e.g., Signalling System 7 and ISDN) have been deployed without consideration of public safety. The public safety community does not have the "market power" to demand these services. A future version of the E9-1-1 network could resemble the network shown in Figure 3.

E9-1-1 is a critical service. As with all systems, there will be a failure in the system at sometime. When the E9-1-1 network, database, and PSAP equipment are all provided by different companies, there can be difficulties resolving system problems because of "finger pointing." If an E9-1-1 system administrator has either in-house or independent technical support available, they can often help to resolve the system problem. However, some E9-1-1 system

administrators do not have technical support available. It would be beneficial for these system administrators to be able to procure the network, database, and PSAP equipment from one vendor. There have been cases where the network service provider will not provide the PSAP equipment because of the perceived limitations of the Modified Final Judgement and prohibitions against supplying terminal equipment. The Commission should provide that all LECs can provide PSAP equipment for E9-1-1 purposes if so requested by the local government.

G. Implementation Schedule

The design and cost impacts of providing enhanced 9-1-1 capability are minimal for the most part. Many PBX manufacturers today can provide multi-frequency CAMA-like trunk capability for a reasonable cost. The use of multi-frequency signalling is well defined through the use of available "off-the-shelf" component parts. In addition, there are "third-party" providers of interface electronics that can provide the signalling conversion and trunk interfaces with little or no design changes in the PBX. Therefore, the Commission's proposed 18-month implementation schedule is reasonable and should be adopted. The Commission should also allow compliance to be demonstrated by either "stand-alone" capabilities within the PBX or through third-party interfaces to provide the required functions. This capability must be clearly demonstrated as part the technical



Possible Database Locations
in an SS7 Network Environment

Adcoam Engineering Company

requirements outlined in Part 68 of the Commission's rules.

We also strongly support the Commission's proposal that all systems installed 30 days after the effective date of the any PBX rules be labeled to identify clearly the proper dialing procedure to obtain E9-1-1 service and any limitations the PBX may have in identifying the proper location of the telephone. The Commission has already set a precedent for this approach in both Parts 68 and 15 of the Commission's rules.

We believe the majority of PBX owners want to provide easy access to E9-1-1 services for their users. However, many of these PBX owners are not familiar with the technical requirements of E9-1-1 systems or the limitations of their PBX equipment. If all telephone equipment had the capability to interface to E9-1-1 networks, there would be rapid deployment of E9-1-1 interfaces, especially in the PBX situations where this is most needed. We believe manufacturers should look at this as an opportunity for a new market, interconnect companies should look at this as additional services they can provide, and PBX owners should look at this as a way to provide a safer working environment.

H. Preemption

The Commission should preempt local regulation of the network interface after the effective date new equipment must

comply with the PBX E9-1-1 interface requirements. The Commission should not, however, preempt local regulations regarding the requirement to connect to E9-1-1 networks, administration of the database, accuracy of the database, database information transfer protocols, and related items. These issues are best left to the relevant state and local regulatory bodies.

The Commission should require that E9-1-1 service providers supply their information and database services in a nationally recognized standard format, specifically the NENA Recommended Database Format. There is a substantial public interest in having a single national database format that allows information to be passed from one system to the next. To that extent, the Commission should preempt any local regulation of the database format.

II. COMPATIBILITY OF WIRELESS SERVICES WITH ENHANCED 9-1-1

Over the past 12 years, the demand by the public for wireless voice services has grown at a rate that caught virtually all of public safety and most of the wireless industry off-guard. Cellular telephone service has gone from being a tool used by business executives to a virtual commodity. Many service providers will "give" the new subscriber a cellular phone for a one year service commitment. There are approximately 22 million cellular phones in use. Many cellular phones today are sold to

provide a measure of security by providing the ability to access public safety services should the caller be threatened or hurt.

In addition, the increasingly mobile public now has the ability to report suspicious activity, crimes in progress, traffic accidents, drunken drivers, domestic violence, sporting accidents, etc. to public safety dispatch centers. This has resulted in significant increases in call volumes to dispatch centers, as discussed in the Notice.

While the first users of cellular systems were primarily vehicular users, currently the majority of the new cellular phones are portable. This has changed the type of calls received from being primarily traffic related incidents to medical emergencies, hold-ups in progress, and even rescues in the mountains. In addition to the increased call volumes associated with these wireless callers, the work required to process the call has increased because the benefits that resulted from implementing E9-1-1 (i.e., automatic number identification and automatic location information) are not available with wireless calls. This is amplified because the callers are often calling from areas with which they are unfamiliar. They often do not know the specific street they are on or the number of miles they are from the last exit. Dispatch centers also often receive multiple calls for the same incident with callers reporting varying locations,

sometimes leading to multiple responses. Better location information would assist in the management of these calls.

Just as wireless services have become more popular, the public's expectation of the level of service available from public safety providers has increased because of the benefits of the service. The many success stories of E9-1-1, and the attention the media gives to E9-1-1 not only as news items but also as entertainment with programs such as Rescue 9-1-1 and COPS has greatly contributed to the public's heightened expectations.

The public as a whole believes E9-1-1 service is available from any device that resembles and functions like a telephone, whether wired or wireless. In fact, that is not the case, at least with wireless telephones. Therefore, as discussed herein, the Commission needs to establish rules regarding E9-1-1 interconnection that apply to any Commercial Mobile Radio Service (CMRS) providing telephone interconnect services.

The features generally available with the E9-1-1 systems today were defined twenty years ago. Many of the limitations of these systems (e.g., lack of intersystem transfer) are functions of the technology used and the software written for the switches to support enhanced 9-1-1. E9-1-1 capabilities provided by new systems should not be limited by the what is

provided today. Rather, this is an opportunity to begin moving E9-1-1 systems ahead into new technology and advanced features. We need to be able to provide an interface to the existing systems, but want to move beyond those limitations in both the wireless and wireline arena. In addition, wireless services are generally regulated at the Federal level whereas wireline services are regulated at the state and local levels. This provides the FCC and public safety a unique opportunity to develop a consistent national approach to wireless E9-1-1 communications. The changes required of the E9-1-1 systems to support wireless could serve to upgrade the existing wireline infrastructure while accommodating the interface to existing systems.

We urge the Commission to require existing CMRS systems to comply with the rules even though there is a large installed base. The most difficult aspect is the determination of the location of the wireless unit. However, information compiled at the Cellular Joint Experts Meeting, August 1994, TR45-Joint Experts Meeting Report, Emergency Services, the Wireless and Emergency Services Joint Experts meeting, October 1994, Joint Experts Meeting Report, Wireless and Emergency Services, and the report prepared by C.J. Driscoll and Associates (¶47, FCC NPRM 94-102) as amended, indicate that viable locating technologies are available that do not require any changes to the subscriber stations.

We are also concerned about the explosion of non-voice wireless services and their impact on (E)9-1-1. Technologies such as two-way paging, IVHS, wireless personal digital assistants, all have the capability for a "panic" or "9-1-1" button feature that will dial 9-1-1. However, there has been little thought as to how the E9-1-1 center will interact with the caller. Panic alarms and intrusion alarms with auto-dialers calling 9-1-1 have been available in the wireline environment for many years. These devices cause difficulties because they are often automatic and result in a high number of false alarms. Because the 9-1-1 telecommunicator cannot interview the caller, they do not know whether to send an aid unit, fire unit, or law enforcement unit. As a result, many state and local governments have passed ordinances prohibiting non-voice devices from dialing 9-1-1. These ordinances would also prohibit most, if not all, non-voice wireless devices from dialing 9-1-1. In addition, barring any national data interface standard, it would be extremely difficult to provide a "digital" interface to communicate with these devices.

Therefore, at this time, the we are generally opposed to non-voice 9-1-1 access, other than by TTY. However, if in the future the concerns of public safety can be addressed, a common interface approach is developed, and local laws permit non-voice equipment to have 9-1-1 access, such equipment

should meet the same requirements as all other wireless E9-1-1 equipment.

The ability to determine who the caller is and where they are located is vital to providing prompt public safety response. Since wireless users have become less technically sophisticated, it is critical to provide access to 9-1-1 services in a manner that is the same as for wireline. This includes subscriber information, call back capability, and location information. Just as the cost of wireless services has gone down, the cost of providing E9-1-1 features will also be going down. Some costs are still high only because the technology is just becoming available in the commercial market. However, the ability to implement E9-1-1 features, including caller location capability, is within the current state-of-the-art.

We support the Commission's proposed timelines of one year for cell specific information, three years for two-dimensional information, and five years for three-dimensional information. However, as discussed below, we recommend a higher level of accuracy within those parameters and timeframes. These timeframes should apply to existing systems as well as new systems. The Commission should also require LECs and other E9-1-1 service providers to provide enhanced capability in their networks so the public safety community can take advantage of the advanced features

provided by wireless service providers. These timeframes should be adequate to allow both the wireless industry and the E9-1-1 service providers opportunity to design and install appropriate technology.

A. 9-1-1 Availability

The Commission should require 9-1-1 availability to the fullest extent possible. We realize there may be practical limitations requiring a wireless unit to be "service initialized" and accept those limitations. In general, 9-1-1 access should be by dialing "9-1-1" only. We also accept the limitation that with cellular units the "SEND" key must also be pressed, which is analogous to lifting the handset on wireline telephones. If possible, future systems should provide for a method of dialing 9-1-1 that does not rely on special procedures. The Commission should prohibit the use of *9-1-1, *9-9-9, or other similar codes to reach 9-1-1.

We believe virtually all of the items listed as needs by public safety in the Wireless and Emergency Services JEM document can be accomplished without changes to the subscriber units for existing services, and can be easily accomplished with new services where there is no installed base. A prioritized list of (PSAP) service requirements is provided below. This list reflects the current public safety position developed through participation in the two Joint Experts Meetings. Each element represents a critical

component necessary for wireless subscribers to have full access to life saving E9-1-1 emergency communications. This list should supersede the list in Appendix D of the NPRM.

PSAP SERVICE REQUIREMENTS

1. Emergency Services can reached by dialing 9-1-1.
2. 9-1-1 call precedence.
3. Identify caller's initial location.
4. Subscriber identity information.
5. 9-1-1 call related information.
6. Ability to request updated caller location information.
7. Ability to communicate with and determine the type of emergency services needed.
8. Receive 9-1-1 calls at the appropriate PSAP.
9. Originate 9-1-1 calls from the current serving system.
10. Ability to detect and communicate with TTY callers.
11. Ability to hold the line after the caller has disconnected or the call has dropped, under the direction of the controlling PSAP.
12. Ability to call back if the call is disconnected or the call is ended prior to the completion of the event.
13. Ability to transfer the call to the appropriate PSAP.

14. Ability to provide ALI information and information captured during the call to another PSAP.
15. Ability of the PSAP to force disconnect for MS to PSAP calls.
16. Area cell congestion control.
17. System congestion control.
18. Authorization override.

Note: A detailed description of each feature is contained in the PCIA/APCO/NENA/NASNA Wireless and Emergency Services Joint Experts Meeting document and report.

The Commission should require that any new or developing service or technology include 9-1-1 access, as defined herein, as a fundamental part of the service offering. This should be a requirement for obtaining an FCC license for the service or system.

Today's wireless callers are extremely mobile, and will carry their wireless units throughout the country. Access to E9-1-1 services should be made available to the fullest extent possible for such "roamers" as well as "home" subscribers. We realize there may be some technical limitations with existing cellular systems. However, the Commission should require that existing systems provide

E9-1-1 access to roamers to the highest degree possible today, and provide improved access and information as the wireless system evolve using more intelligent system interconnections and enhanced data flow.

We agree with the Commission that 9-1-1 availability issues can be resolved and implemented by the wireless industry within one year of the effective date of the rules.

B. Grade of Service

The Commission should adopt a grade of service standard of one busy per 100 9-1-1 call attempts in the average busy hour. This requirement is compatible with most state and local grade-of-service requirements for E9-1-1 access. These grades of service requirements apply only to 9-1-1 call attempts, and not the general grade-of-service provided for non-emergency calls. In addition to the grade-of-service requirements, the Commission should require a minimum of two trunks from each point of presence to the E9-1-1 network to provide some network transport redundancy.

C. 9-1-1 Call Priority

The Commission should adopt rules requiring 9-1-1 call priority as outlined in the Wireless and Emergency Services JEM document. We support the concept of providing 9-1-1 callers priority access in a "busy queue" and granting them

the next available channel at a cell site. This will not be difficult for wireless service providers to provide, as systems supplied by at least one major manufacturer already provide this capability if enabled. The technology is available today; only the lack of industry standards are inhibiting development and implementation.

D. User Location Information

User location information is one of the key issues related to wireless access to E9-1-1. User location information is a principal benefit of E9-1-1, allowing not only the ability to provide aid when the caller is unable to provide the location, but also to route the call to the appropriate PSAP. When E9-1-1 was implemented in wireline systems, millions of dollars were spent by local municipalities re-addressing areas or providing addresses other than postal rural routes. Today, as more and more rural areas are implementing E9-1-1 systems, providing accurate location information for the wireline callers is a critical item that requires much effort by the local government. This is an even bigger issue with wireless callers because there is no fixed location associated with the caller as there is in wireline networks. In addition, a wireless caller is less likely to know their exact location because of their mobility. Therefore, the Commission must require both new and existing wireless services to provide location as part of their enhanced 9-1-1 information.

As shown by the Wireless JEM report and the C.L. Driscoll report, there are numerous location technologies available that can be deployed now or in the near future. Some of these technologies require modifications to the subscriber unit and some do not. It is up to industry to determine the location technology that best suits their requirements while meeting the needs of public safety. However, the information passed to E9-1-1 systems should have the same format regardless of the source of the information.

We support the Commission's proposed timelines of 1 year for cell specific information, 3 years for two dimensional information, and 5 years for three dimensional information, as further discussed below. We believe these timeframes should apply to existing systems as well as new systems. The Commission should also require LECs and other E9-1-1 service providers to provide enhanced capability in their networks so the public safety community can take advantage of the advanced features offered by wireless service providers.

We are concerned that if the Commission were to adopt rules establishing fixed location accuracy requirements based only on existing technology, the industry would limit development to meeting those requirements. Instead, the Commission should adopt location accuracy guidelines that meet the needs of public safety, which will drive the

industry to develop and implement technologies meeting these needs as well as the needs of industry.

The Commission should adopt an ultimate location accuracy requirement of 10 meters with a 95 percent confidence factor. This accuracy should apply to both horizontal and vertical accuracy and be implemented within five years. While searching for a person with a wireless device in an open field may be easy with an accuracy of 125 meters, finding and searching a building may not be. The ability to determine which floor a person is on in a multi-story building can be a matter of life and death. Indeed, a fire can kill long before it is visible and easily identified from the street. Similarly, search time of more than one or two minutes will greatly reduce the survival rate of a heart attack victim. The proposal in the Commission's NPRM for accuracies in the 125 meter range is inadequate because it may simply identify which building, but not which floor. A building 125 meters tall could have 30 or more floors which could not be searched in a reasonable time.

We believe this 10-meter requirement is an obtainable goal in the future particularly in the urban areas with corresponding smaller cells. The choice of which particular technology or technologies is implemented by a specific wireless service provider is a decision to be made by the wireless service provider. The only FCC requirement should

be that it meets the specified needs and requirements of public safety as defined in the rules.

The Commission should require that the location information be provided in a standard format developed with participation by both industry and public safety. The existing NENA database standards were developed with fixed database and non-realtime data transfer in mind. The NENA standards will be expanded to include the transfer of information in real-time from wireless providers to PSAPs. These same standards could also be used to transfer information from PBXs or Competitive Access Providers (CAPs) depending on the requirement.

E. Re-Ring/Call Back

There are many times a PSAP needs to have the ability to call a 9-1-1 caller back to verify information or to determine additional information. In addition, most PSAPs will call wireline 9-1-1 callers back if the caller has hung up prior to or just after answering at the PSAP. Because E9-1-1 systems provide the number of the caller, the PSAP simply dials the number retrieved from the enhanced 9-1-1 system. If the line is busy, an interrupt or verification the line is off-hook is requested from the telephone company. Many PSAPs dispatch a public safety responder (usually law enforcement) to the address shown on the E9-1-1 ALI display. Studies in Washington State have shown with wireline calls,

approximately 30 percent of the "hang-up" calls result in the dispatch of a public safety responder or were determined to be a valid 9-1-1 call requiring a public safety responder.

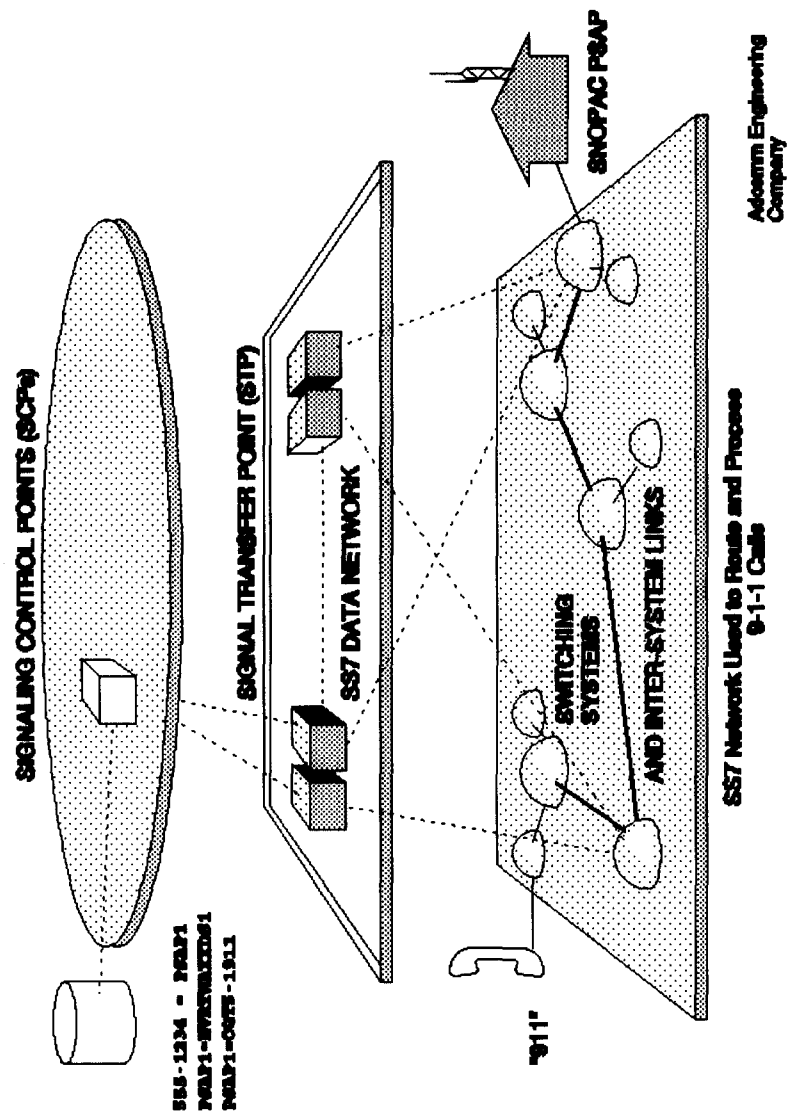
Wireless systems must provide the same or improved capability as current wireline systems. The Commission should require wireless service providers, including existing providers, to develop a method to provide the ability to call back to the wireless caller. This ability should be straightforward and easy to use. The information provided by the wireless carrier to the PSAP should enable the telecommunicator to call the caller back. We understand there may be limitations for providing call-back capability with some types of roamer units with existing systems. However, we believe industry can provide this capability at relatively low cost for all wireless units. As a minimum, the wireless provider could provide the full 10-digit number of the wireless caller, and if the caller is a roamer, the number of the roamer access port should be provided. If the caller has turned off their wireless telephone, we understand and accept a call back will not be possible.

The Commission should require that this capability be provided by the wireless industry in a consistent manner across the nation. The Commission should also require that the standards be developed with the involvement of public safety.

F. Common Channel Signaling

The existing E9-1-1 network is based largely on an essentially obsolete technology that has not evolved in the same manner as the existing wireline network. The public safety community believes that it is absolutely essential for E9-1-1 service to be migrated to mainstream technologies that will evolve as the network evolves. At this time, this evolving network uses Common Channel Signalling (CCS) (currently Signalling System 7 (SS7)) and incorporates the features proposed as part of the Advanced Intelligent Network (AIN). Figure 4 shows how these might work together. Many of the proposals for wireless network design and the interface to the wireline network incorporate SS7 and AIN. The Commission should require that wireline and wireless providers both work with public safety to develop the E9-1-1 network of the future and that new network designs and concepts include provisions for E9-1-1. We believe the Commission has the authority to take such action pursuant to its basic purpose "of promoting safety of life and property through the use of wire and radio communications." 47 U.S.C. §151; NPRM at ¶7.

The following capabilities are an essential part of implementing a CCS solution for wireless and wireline interfaces to E9-1-1.



- Transmission of the call-back number and the caller's identification.
- Location of call origination (ALI)
- The class of service of the caller (e.g., business, residential)
- Routing information to direct the call to the appropriate primary PSAP and for transferring the call to a secondary PSAP.

The existing CCS networks have the potential to provide E9-1-1 features. These networks pass information and provide for routing of calls in a manner similar to that required by E9-1-1 networks. What are missing are standards, software, and industry incentives to provide the necessary functions. Public safety and E9-1-1 account for only a small portion of the overall revenue received by the telephone industry. This problem is further compounded by the fact that today there is not a single company that can affect change as the "old Bell System" could when E9-1-1 was developed. Simply put, there is little economic incentive for major service providers or equipment suppliers to invest significant resources in E9-1-1 system development. As a result, there has been no mechanism to migrate enhanced 9-1-1 networks to mainstream technology on any widespread basis.

However, it should be noted that E9-1-1 systems have already generated over 1 billion dollars in revenue. These

systems represent a long-term commitment and revenue base to telecommunications companies. There are local projects investigating and implementing advanced networks, but these are hampered by the lack of standards. The most notable is the use of a special version of CCS to build a network for the greater Harris County (Houston) E9-1-1 system in Texas. In addition to meeting the local integration requirements, this project serves as a prototype for future systems. This project uses intelligent switching that integrates multiple databases to process calls from various sources. Selective routing databases range from conventional wireline to GIS for selective routing of wireless.

We believe the use of an expanded SS7 would provide a more reliable method for processing E9-1-1 calls. While a few SS7 failures have gained widespread attention, the system as it has matured is very robust and functions well. Many existing enhanced 9-1-1 networks are subject to single point failures, as opposed to the CCS network (e.g., a failure in the selective routing office or in the ALI database). While these failures do not gain the national attention the major SS7 failures did a couple of years ago, they occur and there is often little or no backup. The SS7 network would provide a way to route E9-1-1 calls around failed facilities and to alternate answering locations without having to equip E9-1-1 networks with special hardware as is done now. In addition, the SS7 network approach using expanded versions of either